IN THE CLAIMS:

1. (Currently Amended) Gradient tensor induction magnetic field measuring apparatus for measuring a gradient tensor induction magnetic signal of a transient magnetic field in a wellbore to be used to determine a conductivity gradient of an anisotropic earth formations penetrated by the wellbore, the apparatus comprising e, f and any or any combination of a)[[-d)]] -b), wherein:

a) at least one transmitter coil and a pair of closely located parallel tri-axial EM induction receivers, each formed by three mutually orthogonal receiver coils, separated by a small vector, $\Delta \boldsymbol{r}$, wherein a distance between the two parallel tri-axial EM induction receivers is much smaller than a distance L between the transmitter and a center of the vector $\Delta \boldsymbol{r}$, connecting the two receivers, wherein conditions are fulfilled that the gradients are measured of different components of the magnetic field induced in the earth formation;

b) at least one receiver coil and a pair of closely located parallel tri-axial EM induction transmitter coils, separated by a small vector, $\Delta \boldsymbol{r}$, wherein a distance between the two parallel tri-axial EM induction transmitters is much smaller than a distance L between the receiver and a center of the vector $\Delta \boldsymbol{r}$, connecting the two transmitters, wherein conditions are fulfilled, based on a reciprocity principal, that gradients are measured of different components of the magnetic field induced in the earth formation;

~~c) a tri-axial EM induction transmitter formed by three mutually orthogonal transmitter coils, and a pair of closely located tri-axial EM induction receivers, each formed by three mutually orthogonal receiver coils, separated by a small~~

~~vector, $\Delta\boldsymbol{r}$, wherein a distance between the two tri-axial EM induction receivers is much smaller than a distance L between the tri-axial transmitter and a center of the $\Delta\boldsymbol{r}$, wherein conditions are fulfilled that gradients are measured of different components of the induction tensor formed by the magnetic fields induced in the earth formation;~~

~~d) a pair of closely located tri-axial EM induction transmitters, separated by a small vector, $\Delta\boldsymbol{r}$, and a tri-axial EM induction receiver, wherein~~ a ~~distance between two tri-axial EM induction transmitters is much smaller than the distance L between the tri-axial receiver and the center of the vector $\Delta\boldsymbol{r}$, wherein conditions are fulfilled, based on a reciprocity principal, gradients are measured of different components of the induction tensor formed by the magnetic fields induced in the earth formation; and~~

e) means for receiving voltages induced in said receiver coils; and

f) means for measuring a difference between the said voltages in the different pairs of the receivers, or due to the different pairs of the transmitters.

2. (Previously Presented) The apparatus as defined in claim 1 further comprising:

a) a tri-axial transmitter array and three pairs of receiver coils, measuring $\partial H_z^\beta/\partial x$, $\partial H_x^\beta/\partial z$, and $\partial H_y^\beta/\partial x$ ($\beta = x, y, z$) components;

b) a tri-axial transmitter array and three pairs of receiver coils, measuring $\partial H_z^\beta/\partial z$, $\partial H_x^\beta/\partial z$, and $\partial H_y^\beta/\partial z$ ($\beta = x, y, z$) components;

c) a tri-axial transmitter array and up to 27 pairs of receiver coils, measuring some or all components~~:~~ of $\partial H_\alpha^\beta/\partial\gamma$ ($\alpha, \beta, \gamma = x, y, z$);

d) three mutually orthogonal transmitter coils, displaced along a z-axis and oriented in x-, y-, and z- directions, and three pairs of receiver coils, measuring $\partial H_z^\beta / \partial x$, $\partial H_x^\beta / \partial z$, and $\partial H_y^\beta / \partial x$ ($\beta = x, y, z$) components;

e) three mutually orthogonal transmitter coils, displaced along z-axis and oriented in the x-, y-, and z- directions, and three pairs of receiver coils, measuring $\partial H_z^\beta / \partial z$, $\partial H_x^\beta / \partial z$, and $\partial H_y^\beta / \partial z$ ($\beta = x, y, z$) components;

f) three mutually orthogonal transmitter coils, displaced along z-axis and oriented in the x-, y-, and z- directions, and up to 27 pairs of receiver coils, measuring some or all components of $\partial H_\alpha^\beta / \partial \gamma$ (α, β, $\gamma = x, y, z$).

3. (Previously Presented) A method for measuring conductivity of an anisotropic earth formations penetrated by a wellbore, the method comprising:

a) measuring a gradient of magnetic field between two closely positioned parallel receiver coils, wherein a harmonic (frequency domain) electromagnetic field is generated by at least one transmitter coil, and the receiver coils are separated by a small vector, $\Delta\mathbf{r}$, with a magnetic moment direction of the transmitter coil parallel or different from a magnetic moment direction of the receiver coils, wherein a distance between two parallel receiver coils being much smaller than a distance L between the transmitter and a center of the vector $\Delta\mathbf{r}$, connecting two receivers,

and the receiver pair measures the gradient of the induction magnetic field;

b) obtaining a plurality of measurements for different positions along the wellbore;

c) obtaining from said plurality of measurements a horizontal and vertical conductivities of a medium, and a relative dip angle of the formation by inverting the gradient electromagnetic induction data using a model of a layered anisotropic formation and regularization methods of inverse problem solution.

4. (Previously Presented) The method of claim **3**, further comprising generating a frequency domain current in the transmitter for at least several frequencies, and the receivers measure a signal at several frequencies, wherein multi-frequency gradient measurements are used for frequency gradient EM sounding of the medium at different distances from the wellbore to produce a volume image of anisotropic conductivity distribution around the borehole.

5. (Previously Presented) A method for measuring conductivity of an anisotropic earth formations penetrated by a wellbore, the method comprising:

a) measuring a gradient of a magnetic field at a receiver coil position, wherein a harmonic (frequency domain) or pulse (time domain) electromagnetic field is generated by two closely positioned parallel transmitter coils, separated by a small vector, $\Delta\mathbf{r}$, with a magnetic moment direction of the transmitters parallel or different from a magnetic moment direction of the receiver, wherein two transmitters generate successively a harmonic (frequency domain) primary EM

field which propagates through the anisotropic formation, surrounding the wellbore;

b) obtaining a plurality of measurements for different positions along the wellbore;

c) obtaining from said plurality of measurements a horizontal and vertical conductivities of a medium and a relative dip angle of the formation by inverting gradient electromagnetic induction data, using a model of layered anisotropic formation and regularization methods of an inverse problem solution.

6. (Previously Presented) The method of claim **5**, further comprising generating a frequency domain current in the transmitter for at least several frequencies, and the receivers measure a signal at several frequencies, wherein multi-frequency gradient measurements are used for frequency gradient EM sounding of the medium at different distances from the wellbore to produce a volume image of an anisotropic conductivity distribution around the wellbore.

7. (Cancelled)

8. (Cancelled)

9. (Cancelled)

10. (Cancelled)